

**ROCKY FLATS PLANT
EMD OPERATING
PROCEDURES MANUAL
VOLUME III: GEOTECHNICAL**

**Manual No.: 5-21000-OPS-GT
Procedure No.: Table of Contents, Rev 56
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Organization: Environmental Management**

**THIS IS ONE VOLUME OF A SIX VOLUME SET
WHICH INCLUDES:**

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VOLUME II: GROUNDWATER (GW)
VOLUME III: GEOTECHNICAL (GT)
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**EG&G
SUPERSEDED
DOCUMENT**

ADMINISTRATIVE

**DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R.B. HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991**

A-SW-001366

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94-DMR-000276	Section GT.07 and form Modifications	2	02/28/94
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94-DMR-000133	Sampling Modifications	3	02/04/94
94-DMR-000229	Editorial Correction GT.08	3	03/14/94

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GT.09	Soil Gas Sampling and Field Analysis	2	05/12/92
•94-DMR-000431	Calibration Occurrence Clarification	2	04/11/94
GT.10	Borehole Clearing	2	05/12/92
GT.11	Plugging and Abandonment of Wells	2	05/12/92
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GT.24	Approval Process for Construction Activities on or Near Individual Hazardous Substance Sites (IHSSs)	0	05/12/92

DOCUMENT MODIFICATION REQUEST (DMR)

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Refer to 1-A01-PPG-001 for Processing Instructions.
Print or Type All Information (Except Signatures)

1. Date March 18, 1994 25. DMR. No. 94-DMR-000431 *serio*

2. Existing Document Number/Revision 5-21000-OPS-GT.09/Rev2 3. New Document Number or Document Number if it is to be changed with this Revision NA *3-22*

4. Originator's Name/Phone/Page/Location M.G.Sell/8693/D5934/080 5. Document Title Soil Gas Sampling and Field Analysis

6. Document Type ☒ Procedure ☐ Other 7. Document Modification Type (Check only one)
☐ New ☐ Revision ☒ Intent Change ☐ Nonintent Change ☐ Editorial Correction ☐ Cancellation

8. Item	9. Page	10. Step	11. Proposed Modifications
			Add the following sentence after the first sentence of each of the identified sections: <i>Continuing calibration verification shall be performed</i>
1	8	5.1.2	Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, every eight hours or after 20 samples, whichever is more frequent. <i>a batch of continuing calibration verification shall be performed,</i>
	10	5.2.2	Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, every eight hours or after 20 samples, whichever is more frequent. <i>a batch of continuing calibration verification shall be performed</i>
	26	6.1	Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, every eight hours or after 20 samples, whichever is more frequent. <i>a batch of</i>
2	26	6.1	Add the following sentence to the end of the paragraph in section 6.1. Soil gas analysis should address an adequate level of precision. Soil gas precision values for analysis of duplicate samples can exceed a relative percent difference of 40 percent. Relative percent difference values for duplicate samples will be within the 40% range unless stated otherwise in the project specific work plan.

12. Justification (Reason for Modification, EJO#, TP#, etc.)

1. According to EPA Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series", a working calibration curve or calibration factor must be verified each working day by the measurement of one or more calibration standards. Standard Operating Procedure FO-15, "Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs), Rev 2", also requires calibration at the end of each day. PIDs and FIDs must also be checked "periodically" during operation to ensure response to contaminants. EPA Method 502.2 requires analysis of a laboratory fortified blank with each batch of samples or one laboratory fortified blank for every 20 samples if a batch includes more than 20 samples. This DMR is intended to clarify when calibration must occur.

2. Soil gas duplicate samples results may exceed the precision range of 40%. A statement or statements are needed to clarify this issue of precision criteria for soil gas duplicate samples, because of the wide variability inherent within the particular sampling approach and analytical method being employed.

If modification is for a new procedure or a revision, list concurring disciplines in Block 13, and enter N/A in Blocks 14 and 15. If modification is for any type of change or a cancellation, organizations are listed in Block 13, then Concuror prints, and signs in Block 14, and dates in Block 15.

13. Organization	14. Print and Sign (if applicable)	15. Date (if applicable)
SME	R.G. Smith <i>R.G. Smith</i>	3/22/94
EQS	Mark Brooks <i>Mark Brooks</i>	3-29-94
RPM	Wanda Busby <i>Wanda Busby</i>	3/22/94
EOM	Marla Broussard <i>Marla Broussard</i>	3/24/94
SM	D.D. Stagg <i>D.D. Stagg</i>	3/23/94
SPP	S.R. Keith <i>S.R. Keith</i>	3/29/94

16. Originator's Supervisor (print/sign/date)
R.S. Luker *R.S. Luker* 3-18-94

17. Assigned SME/Phone/Page/Location R.G. Smith/8705/5135/080-643 18. Cost Center 0202 19. Charge Number ENV-GT 20. Requested Completion Date 03/23/94 21. Effective Date 04/11/94

22. Accelerated Review? Yes ☐ No ☒ 23. ORC Review ORC Review not required; this nonintent change was processed as an intent change to expedite the DMR process.

24. Responsible Manager (print, sign, date)
Stephen H. Singer *Stephen H. Singer* 3/29/94

REVIEWED FOR CLASSIFICATION/UCNI
BY NA

DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R.B. HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

SOIL GAS SAMPLING AND FIELD ANALYSIS

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in the placement of monitoring wells, and in the evaluation of the areal extent of soil contamination.

5.1.1 Equipment

- Portable PID or FID
- Calibration gas standards of known concentration as specified in SOP FO.15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)

5.1.2 Instrument Calibration and Operation

See SOP FO.15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs), for instrument operational and calibration requirements. Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, continuing calibration verification shall be performed every eight hours or after a batch of 20 samples, whichever is more frequent.

A factor which will affect total organic vapor concentration measurements is the type of detector which is used (e.g., FID vs. PID). Generally, the FID will be most appropriate for aliphatic hydrocarbons and certain oxygenated solvents while the PID will be more sensitive to aromatic and halogenated hydrocarbons. PID lamps of different ionization energies will respond with varying degrees of sensitivity to the same gases, and are significantly affected by high humidity. Generally, the FID response is proportional to the number of carbon-hydrogen bonds, and can, therefore, be used to estimate concentrations of total hydrocarbons.

5.1.3 Survey Procedures

The following procedures will be used to measure compounds detectable by PIDs and/or FIDs in performing field surveys:

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characteristics of the soil (e.g., temperature, grain size, moisture content, organic carbon content) may have a significant effect on the headspace analysis results, and, therefore, estimates of these parameters should be recorded at the time the measurement is taken. If a PID or FID is used for the headspace analysis, record the results on the appropriate forms, Form GT.9A or GT.9B.

Headspace analyses are useful in that they can provide real-time data to aid in soil removal operations, where decisions regarding the extent of soil excavation and its disposal must be determined on-site. In addition, headspace analyses of soils encountered during investigations can be screened for health and safety purposes.

5.2.1 Equipment

- Portable PID or FID
- Calibration gas standards of known concentration as specified in SOP FO.15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)
- Split-spoon sampler, hand auger, or other soil sampling apparatus
- Wide-mouth sample jars with screw-cap lids
- Aluminum foil

5.2.2 Instrument Calibration and Operation

See SOP FO.15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs), for instrument operational and calibration requirements. Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, continuing calibration verification shall be performed every eight hours or after a batch of 20 samples, whichever is more frequent.

A factor which will affect total organic vapor concentration measurements is the type of detector which is used (e.g., FID vs. PID); see Subsection 5.1.2 for discussion.

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- QC Samples -- The number and types of QC samples including duplicate samples, field blanks, equipment blanks, and trip blanks will be collected or prepared as specified in the QAA.
- Verification -- Verification activities are required for the above practices, including surveillance and periodic record audits. These activities will be documented and become part of the completed project records.

6.1 QA/QC SAMPLES FOR FIELD GC ANALYSIS

Frequency of calibration, method blanks, replicates, etc. are dependent upon project Data Quality Objectives (DQOs), and must be addressed in the project-specific Quality Assurance Addendum (QAA). Calibration of instruments involved in soil gas analysis shall occur at the beginning of each working day and, after that, continuing calibration verification shall be performed every eight hours or after a batch of 20 samples, whichever is more frequent. Soil gas analysis should address an adequate level of precision. Soil gas precision values for analysis of duplicate samples can exceed a relative percent difference of 40 percent. Relative percent difference values for duplicate samples will be within the 40% range unless stated otherwise in the project specific work plan.

7.0 DOCUMENTATION

For each soil gas location, a permanent record of the implementation of this SOP will be kept by documenting field observations and data. Observations and data will be recorded with black waterproof (permanent) ink on the attached forms; the Photoionization Detector Field Data Form (Form GT.9A), the Flame Ionization Field Data Form (Form GT.9B), the Soil Gas Survey Map (Form GT.9C), and the Soil Gas Survey Form (Form GT.9D). Observations may also be documented in a bound weatherproof field notebook with consecutively numbered pages. This information will include the following:

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